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EXAMINER	
TRAN, KHANH C	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/643,155	STEELE ET AL.	
	Examiner	Art Unit	
	Khanh Tran	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *27-32* is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/09/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-3, 5, 7, 14-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh U.S. 2003/0152176 A1 in view of Strolle et al. U.S. Patent 6,560,299 B1 and Webster et al. U.S. Patent 6,233,273 B1.

Regarding claim 1, in paragraph [0013], Ghosh is directed to a method and system for performing joint equalization and decoding of Complementary Code Key (CCK) encoded symbols.

Ghosh does not expressly show a plurality of antennas such that what is received from the wireless channel is not identical at each of the plurality of antennas. Strolle et al. teaches a multiple channel diversity receiver embodying a joint signal processing as shown in figure 1. The multiple-channel diversity receiver employs a joint equalizer 26, a slicer 32, and a DFE 34. Ghosh and Strolle et al. teachings have similar structure and are in the same field of endeavor. Ghosh invention differs from Strolle et al. in that Ghosh does not show a plurality of antennas having signal diversity. Nevertheless, because Ghosh is directed to a method and system for performing joint equalization, it would have been obvious for one of ordinary skill in the art at the time the invention that

Ghosh teachings can be modified to employ a plurality of antennas, as taught by Strolle et al., for performing diversity reception. The modification is obvious because joint processing would involve processing multiple signals and both teachings are directed to joint equalization. Furthermore, due to multipath, signals arrive differently to each of the plurality of antennas.

Figure 3 of Ghosh invention illustrates a joint DFE and CCK decoding structure, which corresponds to the claimed demodulation logic in the digital signal processing logic that demodulates signals from two or more of the plurality of antennas. In paragraph [0023], in accordance with the configuration illustrated in figure 3, the CCK decoder/Barker despreader device 25' is embedded into a DFE feedback loop 30 including the feedback filter. In light of the foregoing disclosure, the received signals are Barker modulated signals and complementary code keying (CCK) signals. The CCK decoder/Barker despreader device 25' includes Barker correlators.

Ghosh teaches CCK decoder, but does not teach a CCK decoder being a correlator as claimed in the application claim.

Webster teachings are directed to an enhanced RAKE receiver architecture that contains a chip-based decision feedback equalizer (DFE) structure embedded in the signal processing path through the receiver's channel matched filter and codeword correlator. Figure 10 illustrates a DFE-embedded signal processing architecture for canceling multipath-based inter-codeword interference, the DFE-embedded signal processing architecture including a

codeword correlator. In column 5 lines 45-65, Webster teaches that the invention can be applied to any codeword modulated direct sequence spread spectrum (DSSS) signal, including *complementary codes*. Webster invention differs from Ghosh invention in that Webster employs a codeword correlator while Ghosh uses a CCK decoder. Because Ghosh and Webster teachings are in the same field of endeavor and both teachings have similar structure, therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made that Ghosh CCK decoder can be modified to implement a correlator as taught by Webster. The modification is obvious in view of Webster because Webster teachings can be applied to any codeword modulated direct sequence spread spectrum (DSSS) signal, including *complementary codes*. Ghosh and Webster teachings are implemented to combat multipath that leads to intersymbol interference in a digital symbol stream.

Regarding claim 2, figure 3 of Ghosh invention is similar to figure 2, except the CCK decoder/Barker despreader device 25' is embedded into a DFE feedback loop 30. In view of that, the DFE feedback loop 30 includes a Barker correlator and a barker slicer.

Regarding claim 3, as recited in claim 2, figure 3 of Ghosh invention is similar to figure 2, and except the CCK decoder/Barker despreader device 25' is embedded into a

DFE feedback loop 30. In view of that, the DFE feedback loop 30 includes a CCK correlator and a CCK slicer.

Regarding claim 5, as recited in claim 1, figure 3 further shows CCK decoder/Barker despreader device 25' embedded into a DFE feedback loop 30 including a feedback filter.

Regarding claim 7, figure 3 illustrates a DFE structure 20', which inherently includes a feedback filter as claimed in the application claim. Ghosh does not expressly disclose a symbol-by-symbol minimum distance receiver as set forth in the claim. Nevertheless, in paragraphs [0023] [0024] [0025] [0026], Ghost expresses that the embedded CCK decoder 20' chooses, from the set of 256 possible codewords, the codeword that minimizes the metric set forth in the equation 3. The equation 3 represents a minimum distance between those chips corresponding to past decoded CCK symbols and the chips corresponding to a present transmitted symbol. In view of that, the embedded CCK decoder 25' decodes a CCK codeword in accordance with symbol-to-symbol minimum distance (SbS MDR) technique. As result of that, the embedded CCK decoder 25' performs equivalent function of the claimed (SbS MDR) receiver.

Regarding claim 14, claim 14 is rejected on the same ground as for claim 7 because of similar scope.

Regarding claim 15, referring to figure 3, Ghosh invention is directed to a method and system for performing *joint* equalization and decoding of CCK encode symbols. In view of that, the received signal r_k is representative of more than one input signal.

Regarding claim 16, referring to figure 3, joint received signal r_k is different than the one of more input signals.

Regarding claim 17, figure 3 further shows CCK decoder/Barker despreader device 25' is embedded into a DFE feedback loop 30. Barker despreader is inherently a Barker demodulator.

Regarding claim 18, as recited in claim 17, figure 3 further shows CCK decoder/Barker despreader device 25' is embedded into a DFE feedback loop 30. The CCK decoder corresponds to the claimed complimentary code keying demodulator.

Regarding claim 19, as recited in claim 17, figure 3 further shows CCK decoder/Barker despreader device 25' is embedded into a DFE feedback loop 30, which inherently includes a decision feedback equalizer.

2. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh US 2003/0152176 A1, Strolle et al. U.S. Patent 6,560,299 B1 and Webster et al. U.S.

Patent 6,233,273 B1 as applied to claim 1 and further in view of Yen US 2003/0123585 A1.

Regarding claim 4, Ghosh and Webster do not teach the feed forward filter is a mean-square error equalizer. Yen discloses in an US Patent Application Publication a similar structure shown in figure 5 including a feed forward equalizer 51, a feedback equalizer 55. In paragraph [0023], Yen further teaches that the parameters of the FFE 51 can be set up by minimum mean square error criterion. Ghosh, Webster et al. and Yen teachings are in the same field of endeavor. All teachings employ a feedforward equalizer and a DFE to minimize Inter-symbol Interference. Because mean square error calculation is a known method in equalizer, it would have been obvious for one of ordinary skill in the art at the time of the invention that Ghost forward filter can be configured as a mean-square-error equalizer as taught in Yen invention.

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh US 2003/0152176 A1, Strolle et al. U.S. Patent 6,560,299 B1 and Webster et al. U.S. Patent 6,233,273 B1 as applied to claim 1 above, and further in view of Allpress et al. US 2002/0131488 A1.

Regarding claim 6, in paragraph [0021], see figure 3, Ghosh teaches forward filter 12' performing both matched filtering and equalization. However, Ghosh does not teach forward filter 12' performing whitened-matched filtering as claimed in the pending application. Nevertheless, in paragraph [0033], Allpress et al. discusses a prior art block diagram 700 of a DFE device, see figure 7. A standard decision feedback equalizer

(DFE) includes a feedforward filter (FFF) 702 and a feedback filter (FBF) 704. The FFF is generally designed to act as a whitened matched filter to the received incoming signal, thus maximizing the signal to noise ratio, white keeping the statistical properties of the noise Gaussian with zero mean. In view of the prior art disclosure, it would have been obvious for one of ordinary skill in the art at the time of the invention that Ghost forward matched filter can be modified to include noise whitening as discussed in prior art. The modification is obvious that because of Allpress et al. teachings, a whitened matched filter maximizes signal to noise ratio, white keeping the statistical properties of the noise Gaussian with zero mean. Furthermore, Ghosh teachings are joint equalization and decoding of CKC encoded symbols. Hence, the forward filter 12', as shown in figure 3, operates on a combined plurality of received signals.

4. Claims 8-13, 20-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh U.S. 2003/0152176 A1, Strolle et al. U.S. Patent 6,560,299 B1 and Webster et al. U.S. Patent 6,233,273 B1 as applied to claim 7, and further in view of Halford et al. U.S. Patent 6,614,836 B1.

Regarding claim 8, Ghosh teaches the embedded CCK decoder 25' performs equivalent function of the claimed (SbS MDR) receiver, but does not teach the embedded CCK decoder 25' comprising elements as set forth in the claim.

Halford et al. invention is directed to an alternative channel matched/RAKE receiver modification in which the minimum distance calculation

for each codeword (symbol) generated through the channel-matched filter and codeword correlator is adjusted or corrected by a bias correction or 'de-bias' value that corresponds to the expected power for that symbol as a result of being transmitted over the multipath channel; see column 3, lines 50-67. As shown in figure 8, in column 6, lines 35-60, the modified RAKE receiver comprises a channel-matched filter 81, a codeword correlator 82, a signal combiner 83 also supplied with a de-bias input calculated by a distorted codeword signature generator 84. Output of signal combiner 83 is coupled to a peak detector 85, which selects the largest 'de-biased' output as the transmitted codeword. As recited above, because Halford et al. invention is directed to an alternative channel matched/RAKE receiver modification in which the minimum distance calculation for each codeword (symbol) generated through the channel-matched filter and codeword correlator is adjusted or corrected by a bias correction or 'de-bias' value that corresponds to the expected power for that symbol as a result of being transmitted over the multipath channel, the modified RAKE receiver in figure 8 performs equivalent function of the claimed SbS MDR receiver. The channel-matched filter 81 corresponds to the claimed SbS MDR matched filter, the codeword correlator 82 corresponds to the claimed correlator, and peak detector 85 performs equivalent function of the claimed slicer.

Halford et al. invention differs from Ghosh invention in that Halford et al. modified RAKE receiver comprises elements similar to the claimed limitations. Halford et al. further teaches an embodiment in figure 10, in which codeword

correlator 120 performs the de-biasing mechanism described in figure 8 of Halford et al. invention. Furthermore, the embodiment of figure 10 in Halford et al. invention is the same embodiment of figure 10 in Webster et al. (US 6,233,273 B1) in which the Examiner relies on for the rejection of claim 1. In light of the aforementioned discussion, it would have been obvious for one of ordinary skill in the art at the time of the invention that Ghosh teachings (figure 3) can be modified to implement the modified RAKE receiver in figure 8 as taught in Halford et al. invention.

Regarding claim 9, claim 9 is rejected on the same ground as for claim 6 because of similar scope.

Regarding claim 10, referring to figures 8 and 10 of Halford et al. invention, as recited in claim 8, the code correlator 120 performs the de-biasing mechanism as described in figure 8. In light of the foregoing teachings, figure 10 implements a combined channel matched filter and a feedback filter.

Regarding claim 11, referring to figure 8 of Halford et al. invention, de-biasing is performed before peak detector.

Regarding claim 12, claim 12 is rejected on the same ground as for claim 9 because of similar scope.

Regarding claim 13, claim 13 is rejected on the same ground as for claim 10 because of similar scope.

Regarding claim 20, claim 20 is rejected on the same ground as for claim 8 because of similar scope.

Regarding claim 21, claim 21 is rejected on the same ground as for claim 9 because of similar scope.

Regarding claim 22, claim 22 is rejected on the same ground as for claim 10 because of similar scope.

Regarding claim 23, claim 23 is rejected on the same ground as for claim 11 because of similar scope.

Regarding claim 24, claim 24 is rejected on the same ground as for claim 12 because of similar scope.

Regarding claim 25, claim 25 is rejected on the same ground as for claim 13 because of similar scope.

Regarding claim 26, referring to figures 8 and 10 of Halford et al. invention, as recited in claim 8, the code correlator 120 performs the de-biasing mechanism as described in figure 8. The channel matched filter 81 of figure 8 corresponds to the claimed SbS MDR matched filter. Because the embodiment of figure 8 is embedded in to the code correlator 120 of figure 10, the channel matched filter 101 of figure 10 is a distinct filter from the channel matched filter 81 of figure 8.

Allowable Subject Matter

5. Claim 27 is allowed.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 27, claim is allowed over prior art of record since the cited references taken individually or in combination fails to disclose a wireless receiver for receiving data over wireless channel comprising "*a first combined filter as set forth in the application claim*" and "*a second combined filter as set forth in the application claim*".

6. Claims 28-30 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 28, claim is allowed over prior art of record since the cited references taken individually or in combination fails to disclose a wireless receiver for receiving data over wireless channel comprising "*a first combined filter as set forth in*

the application claim" and "*a second combined filter as set forth in the application claim*".

7. Claims 31-32 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 28, claim is allowed over prior art of record since the cited references taken individually or in combination fails to disclose a wireless receiver for receiving data over wireless channel comprising "*a first combined filter as set forth in the application claim*" and "*a second combined filter as set forth in the application claim*".

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chang et al. US Patent Publication 2003/0147478 A1 discloses "Complementary Code Keying Demodulation System".

Somayazulu US Patent Publication 2002/0122466 A1 discloses "Fast Transform System For An Extended Data Rate WLAN System".

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

Khanh cong Tran 04/29/2005

Examiner KHANH TRAN